

RED SEAL

THE INTERPROVINCIAL STANDARDS RED SEAL PROGRAM



National Occupational Analysis

2008 | **Boilermaker**

Human Resources and
Social Development Canada

Ressources humaines et
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Occupational Analyses Series

Boilermaker

2008

Trades and Apprenticeship Division

Division des métiers et de l'apprentissage

Workplace Partnerships Directorate

Direction des partenariats en milieu de
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The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis as the national standard for the occupation of boilermaker.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Social Development Canada (HRSDC) sponsors a program, under the guidance of the Canadian Council of Directors of Apprenticeship (CCDA), to develop a series of national occupational analyses.

The National Occupational Analyses have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

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**LIST OF PUBLISHED
NATIONAL OCCUPATIONAL ANALYSES
(Red Seal Trades)**

TITLE	NOC* Code
Agricultural Equipment Technician (2007)	7312
Appliance Service Technician (2005)	7332
Automotive Painter (2005)	7322
Automotive Service Technician (2005)	7321
Baker (2006)	6252
Boilermaker (2008)	7262
Bricklayer (2007)	7281
Cabinetmaker (2007)	7272
Carpenter (2005)	7271
Concrete Finisher (2006)	7282
Construction Electrician (2003)	7241
Cook (2003)	6242
Electrical Rewind Mechanic (1999)	7333
Electronics Technician – Consumer Products (1997)	2242
Floorcovering Installer (2005)	7295
Glazier (2004)	7292
Hairstylist (2005)	6271
Heavy Duty Equipment Technician (2004)	7312
Industrial Electrician (2003)	7242
Industrial Mechanic (Millwright) (2007)	2243
Instrumentation and Control Technician (2007)	7311
Insulator (Heat and Frost) (2007)	7293
Ironworker (Generalist) (2006)	7264
Ironworker (Reinforcing) (2006)	7264
Ironworker (Structural/Ornamental) (2006)	7264
Lather (Interior Systems Mechanic) (2007)	7284
Machinist (2005)	7231

* National Occupational Classification

TITLE	NOC* Code
Metal Fabricator (Fitter) (2003)	7263
Mobile Crane Operator (2006)	7371
Motorcycle Mechanic (2006)	7334
Motor Vehicle Body Repairer (Metal and Paint) (2005)	7322
Oil Burner Mechanic (2006)	7331
Painter and Decorator (2007)	7294
Partsperson (2005)	1472
Plumber (2003)	7251
Powerline Technician (2004)	7244
Recreation Vehicle Service Technician (2006)	7383
Refrigeration and Air Conditioning Mechanic (2004)	7313
Rig Technician (2008)	8232
Roofer (2006)	7291
Sheet Metal Worker (2006)	7261
Sprinkler System Installer (2003)	7252
Steamfitter — Pipefitter (2007)	7252
Tilesetter (2004)	7283
Tool and Die Maker (2005)	7232
Transport Trailer Technician (2008)	7321
Truck and Transport Mechanic (2007)	7321
Welder (2004)	7265

Requests for these National Occupational Analyses may be forwarded to:

Trades and Apprenticeship Division
Workplace Partnership Directorate
Human Resources and Social Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9

These publications are also available to order or download online at: www.red-seal.ca. Links to Essential Skills Profiles for some of these trades are available on this website.

To facilitate understanding of the occupation, the work performed is divided into the following categories:

Elock	the largest division within the analysis which reflects a distinct set of operations relevant to the occupation.
Task	the distinct activity that, combined with others, makes up the logical and necessary steps the worker is required to perform in a block.
Sub-Task	the smallest division of work activities that, combined together, fully describe all duties of a task.
Supporting Knowledge and Abilities	the elements of skill and knowledge that an individual must acquire to adequately perform a sub-task.

Information on the following areas of this occupation is also provided throughout the analysis:

Trends	any shifts or changes in technology that affect the block.
Context	statements written to clarify the intent and meaning of tasks.
Related Components	components related to a specified task being undertaken.
Tools and Equipment	types of tools and equipment necessary to perform the work on all given tasks identified within the block. More detailed lists of these types are shown in Appendix A.

The appendices located at the end of the analysis are described as follows:

Appendix A – Tools and Equipment	a non-exhaustive list of tools and equipment used in this trade.
Appendix B – Glossary	definitions or explanations for terms used in this analysis.
Appendix C – Acronyms	a list of acronyms used in this analysis with their full name.
Appendix D – Block and Task Weighting	the block and task percentages as submitted by each jurisdiction at the validation stage and the national averages of these percentages.
Appendix E – Pie Chart	a graph which depicts the national percentages assigned to blocks.
Appendix F – Task Profile Chart	a chart which outlines graphically the blocks, tasks and sub-tasks of this analysis.

Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from HRSDC. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

The NOA development team then forwards a copy of the analysis and its translation to provincial/territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

Validation and Weighting Method

This copy of the analysis is sent to all provinces/territories for validation and weighting. Each jurisdiction validates the document with the use of a provincial/territorial trade advisory committee. They examine the blocks, tasks and sub-tasks of the analysis:

- | | |
|------------------|---|
| BLOCKS | Each committee assigns percentages to blocks based on the number of questions that they would assign for each block on a hundred question examination of the entire trade. |
| TASKS | Each committee assigns percentages to tasks based on the number of questions that would be assigned to each task on a hundred question examination for its block. |
| SUB-TASKS | Sub-tasks are examined by each committee and they indicate with a YES or NO whether or not each sub-task is performed by the skilled workers within the occupation in their jurisdiction. |

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The analysis provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting provide guidelines for the development of the Interprovincial Red Seal Examination for the trade.

This method for the validation of the National Occupational Analysis also identifies common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task is performed by qualified workers in the occupation in a specific jurisdiction.
NO	sub-task is not performed by qualified workers in the occupation in a specific jurisdiction.
NV	<u>N</u> ot <u>V</u> alidated by a province/territory.
ND	<u>N</u> ot <u>D</u> esignated in a province/territory.
NOT COMMON CORE (NCC)	sub-task, task or block is performed by less than 70% of responding jurisdictions; these are not to appear on the Interprovincial Red Seal Examination for this trade.
BLOCK %	the average percentage of questions that will be placed on an Interprovincial Red Seal Examination to assess each block of the analysis.
TASK %	the average percentage of questions that will be placed on an Interprovincial Red Seal Examination to assess each task of the analysis.

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

ANALYSIS

Safe working procedures and conditions, accident prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and work environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free work environment.

It is imperative to apply and be familiar with the Occupational Health and Safety Acts and Workplace Hazardous Materials Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

Safety education is an integral part of training in all jurisdictions. As safety is an imperative part of all trades, it is assumed and therefore it is not included as a qualifier of any activities. However, the technical safety tasks and sub-tasks specific to the trade are included in this analysis.

SCOPE OF THE BOILERMAKER TRADE

"Boilermaker" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by a boilermaker whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Boilermaker	✓	✓	✓		✓		✓	✓	✓				
Construction Boilermaker				✓		✓				✓			

Boilermakers construct, install, test, maintain and repair boilers, tanks and other vessels that contain liquids, gases and dry products. These vessels may have unique characteristics. Boilermakers may work from blueprints to fabricate components from steel or other materials. They often have to attach rigging and work with cranes to lift components into place. The systems must be tested for leaks and other defects to ensure they are operating safely and efficiently.

Boilermakers require a good understanding of welding methods and procedures. However, while welding is a component of this trade, jurisdictions may or may not permit certain welding processes without further certification.

Boilermakers are employed in industries such as metal fabricating, construction, shipbuilding, petroleum, and power generation (hydro, nuclear, thermal). They may be employed in the construction and maintenance of pulp mills, water treatment plants, steel mills, cement, fertilizer and potash plants, breweries, ship yards, offshore platforms, mines, hydro dams and generating stations, as well as ethanol, oil and gas plants.

Boilermakers employ both hot and cold working methods to shape steel components and other materials to form boilers, tanks and vessels. They must use various metal forming machines such as rotary shears, punch presses and bending rolls. Tools such as levels, wedges, grinders and cutting torches are used to smooth edges so the parts fit together. They also use a variety of test equipment and measuring devices. Boilermakers also use tools common to other trades. The work environment of boilermakers can expose them to hazards. Their work is performed indoors or outdoors and may be at extreme heights or underground. They may be exposed to conditions such as vibration, excessive noise, fumes and other toxic environments, confined spaces, and high degrees of heat.

Key attributes for people entering this trade are: good hand-eye coordination, mechanical aptitude and manual dexterity. Boilermakers must have knowledge of mechanical drawings, and have mathematical aptitudes. They also require strength and stamina to work with heavy components and equipment.

This analysis recognizes similarities and overlaps with the work of metal fabricators, industrial mechanics (millwrights), steamfitters/pipefitters, ironworkers and welders.

With experience, boilermakers may act as mentors and trainers to apprentices in the trade. They may also advance to supervisory positions, quality assurance persons and safety personnel.

New technology, such as automated welding, cutting and fitting equipment, means that some fabrication procedures are becoming more efficient.

Pre-lift meetings increase the awareness of hazards and safety requirements of the specific lift and ensure that all personnel are "on the same page", resulting in more synchronization between boilermakers and third parties. Engineered lifts are becoming more common.

Due to new crane and transport technology, many larger components and vessels are delivered to the site as complete modules rather than being assembled on site. More of the boilermakers' fabrication is now done in a shop environment.

New components to reduce emissions are increasingly being installed in facilities such as power plants, gas plants and smelters. Boilermakers are responsible for the installation, maintenance and repair of these components:

To meet energy demands, there is an increase in the construction of more co-generation and hydro-electric power plants, ethanol plants and nuclear power plants.

There is a greater emphasis and requirement for additional licences, certificates and training for specific trade qualifications such as welding, rigging, machinery operation and safety.

BLOCK A

OCCUPATIONAL SKILLS

Trends

Automated fitting processes are being used to assemble components.
Heat induction is being used for tube removal.
Track cutters and high speed machining are being used to cut and mill wall platens in boiler rebuilds.
There are computer-operated cutting machines in use in some fabrication shops.
Increasingly, certification is required for any scaffolding work.
With a clearer definition of what constitutes "confined space", the requirement for monitoring has received increased emphasis.

Related Components

All components apply.

Tools and Equipment

See Appendix A.

Task 1

Uses and maintains tools and equipment.

Context

Boilermakers must use and maintain tools and equipment in order to perform the duties of the trade.

Sub-task

1.01

Maintains hand tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 1.01.01 knowledge of types of personal hand tools such as utility knives and measuring tapes
- 1.01.02 knowledge of types of trade tools such as hammers, chisels, dogs and wedges, punches, wrenches, screwdrivers and scrapers

1.01.03	ability to sharpen and maintain chisels, wedges, chipping hammers and prick/center punches
1.01.04	ability to clean hand tools
1.01.05	ability to store hand tools
1.01.06	ability to recognize worn, damaged and defective hand tools

Sub-task

1.02 Maintains power tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.02.01	knowledge of types of electric and pneumatic power tools such as grinders, impact wrenches, drills and milling machines
1.02.02	knowledge of hydraulic power tools such as hydraulic jacks and rams
1.02.03	knowledge of certification requirements for powder-actuated tools
1.02.04	ability to clean, lubricate and store power tools
1.02.05	ability to clean, lubricate and store powder-actuated tools
1.02.06	ability to recognize and remove from service worn, damaged and defective power tools

Sub-task

1.03 Maintains measuring and layout tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.03.01	knowledge of measuring tools such as tape measure, transit and steel square
1.03.02	knowledge of layout tools such as trammel points, prick/center punch, dividers and levels
1.03.03	ability to verify calibration of measuring and layout tools
1.03.04	ability to adjust, clean and store measuring and layout tools
1.03.05	ability to recognize and remove from service worn, damaged and defective measuring and layout tools

Sub-task**1.04****Maintains shop equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	no	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 1.04.01 knowledge of types of shop equipment such as burning table, radial drill press, brake press, shears and rolls
- 1.04.02 ability to clean and adjust shop equipment
- 1.04.03 ability to change components such as blades and dies
- 1.04.04 ability to recognize and remove from service worn, damaged and defective shop equipment
- 1.04.05 ability to top up fluids

Sub-task**1.05****Maintains cutting and welding tools and equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 1.05.01 knowledge of types of cutting and welding tools and equipment such as hoses, cables, tips and torches
- 1.05.02 ability to check cables, connectors and ground clamps
- 1.05.03 ability to clean and store cutting and welding tools and equipment
- 1.05.04 ability to identify unsafe cutting and welding tools and equipment
- 1.05.05 ability to repair or remove from service worn, damaged and defective cutting and welding tools and equipment

Sub-task**1.06****Uses aerial work platforms and access equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.06.01	knowledge of aerial work platforms such as scaffolding, scissor lifts and telescoping man lifts
1.06.02	knowledge of access equipment such as ladders and scaffolding
1.06.03	knowledge of federal, provincial/territorial, municipal and site-specific regulations regarding aerial work platforms and access equipment
1.06.04	knowledge of operating procedures of aerial work platforms
1.06.05	knowledge of training and certification requirements for aerial work platforms and access equipment
1.06.06	knowledge of limitations of aerial work platforms and access equipment
1.06.07	ability to determine scaffold and platform requirements
1.06.08	ability to interpret and follow scaffold tags
1.06.09	ability to complete aerial work platform logbook
1.06.10	ability to secure aerial work platforms and access equipment
1.06.11	ability to install safety features such as toe boards, guard rails, guy wires and fall protection equipment
1.06.12	ability to recognize and remove from service worn, damaged and defective aerial work platforms and access equipment

Sub-task

1.07

Uses personal protective equipment (PPE) and safety equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.07.01	knowledge of types of PPE such as respirators, harnesses, hard hats, safety glasses and steel-toed boots
1.07.02	knowledge of types of safety equipment such as fire extinguishers, fall arrest, safety shower and safety tape
1.07.03	knowledge of PPE and safety equipment operations
1.07.04	knowledge of training requirements for PPE
1.07.05	knowledge of workplace safety and health regulations related to the use of PPE and safety equipment
1.07.06	knowledge of site locations and requirements for PPE and safety equipment
1.07.07	ability to select PPE and safety equipment according to task

1.07.08	ability to recognize and remove from service worn, damaged and defective PPE and safety equipment
1.07.09	ability to maintain PPE and safety equipment
1.07.10	ability to store PPE and safety equipment

Task 2

Organizes work.

Context

In order to organize their work, boilermakers must be able to use documents and drawings and be able to communicate effectively with others.

Sub-task

2.01

Uses documentation.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

2.01.01	knowledge of documentation such as packing slips, mill test reports (MTRs), code books, crane load charts and rigging manuals
2.01.02	knowledge of safety documentation such as Material Safety Data Sheets (MSDS) and Workplace Hazardous Materials Information System (WHMIS) symbols
2.01.03	knowledge of site-specific documentation
2.01.04	ability to locate information such as WHMIS documents
2.01.05	ability to interpret work orders
2.01.06	ability to refer to jurisdictional and national codes
2.01.07	ability to complete work-related records such as task cards, job safety analysis (JSA) and safety audits
2.01.08	ability to check material received against work orders and specifications
2.01.09	ability to document jobsite conditions such as oxygen levels and hazardous conditions

Sub-task**2.02**

Uses drawings and specifications.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

2.02.01	knowledge of types of specifications such as tolerances, grades of material and welding criteria
2.02.02	knowledge of symbols such as welding, steel designation and datum
2.02.03	ability to scale drawings
2.02.04	ability to interpret drawings such as fabrication, assembly, structural and engineered lift drawings
2.02.05	ability to interpret manufacturers' specifications
2.02.06	ability to draw a sketch
2.02.07	ability to convert between metric and imperial measurements
2.02.08	ability to visualize in three dimensions

Sub-task**2.03**

Organizes project tasks and procedures.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

2.03.01	knowledge of task requirements
2.03.02	knowledge of sequence of operations
2.03.03	knowledge of materials required
2.03.04	knowledge of requirements of other trades
2.03.05	ability to adapt to changing environmental conditions
2.03.06	ability to estimate time requirement to complete each operation
2.03.07	ability to prioritize sequence of operations
2.03.08	ability to organize materials and tools for task
2.03.09	ability to coordinate tasks with co-workers

Sub-task**2.04****Handles materials and components.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

2.04.01	knowledge of types, sizes and grades of materials such as tubes, plates, studs, fiberglass, nuts and bolts
2.04.02	knowledge of space constraints
2.04.03	knowledge of hand signals
2.04.04	knowledge of safety requirements for handling and storing gas cylinders
2.04.05	knowledge of cribbing and blocking methods
2.04.06	ability to use plate clamps and plate racks
2.04.07	ability to prevent damage and contamination to components and materials
2.04.08	ability to use appropriate lifting devices
2.04.09	ability to store materials
2.04.10	ability to organize materials according to space available
2.04.11	ability to recognize hazards of unloading materials and components

Sub-task**2.05****Communicates with others.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

2.05.01	knowledge of trade terminology
2.05.02	knowledge of verbal and written communication
2.05.03	ability to acquire information through questioning
2.05.04	ability to use communication equipment and methods such as two-way radios, telephones and life lines
2.05.05	ability to communicate with supervisors
2.05.06	ability to consult with colleagues
2.05.07	ability to communicate with other tradespeople such as crane operators, steamfitters/pipefitters, industrial mechanics (millwrights) and carpenters

2.05.08	ability to communicate with in-plant personnel
2.05.09	ability to use confined space communication protocols
2.05.10	ability to use hand signals
2.05.11	ability to mentor apprentices

Task 3

Performs routine trade activities.

Context

Inspecting and testing are important to identify defective and worn components to ensure that the system has been constructed or repaired properly.

Boilermakers must monitor confined spaces to ensure the safety of workers repairing or constructing the system.

Sub-task

3.01

Inspects vessels and components for defects.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.01.01	knowledge of metallurgy testing theory and applications
3.01.02	knowledge of component parts and their application
3.01.03	ability to clean welded surface for inspection
3.01.04	ability to recognize common defects such as dents, cracks and flaws
3.01.05	ability to identify weld deficiencies such as undercut, pin holes, porosity and cold lap
3.01.06	ability to perform visual inspection
3.01.07	ability to purge tubes to carry out an inspection
3.01.08	ability to inspect components for alignment
3.01.09	ability to report deficiencies and defects to the supervisor

Sub-task**3.02****Tests vessels and components.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- | | |
|---------|---|
| 3.02.01 | knowledge of non-destructive test (NDT) methods such as ultra sound, hydrostatic, air testing, magnetic particle, radiography and dye penetrant |
| 3.02.02 | knowledge of vessels and components to be tested such as new vessels, exchangers, towers, boilers and tanks |
| 3.02.03 | ability to prepare components for testing |
| 3.02.04 | ability to select and use tools and equipment |
| 3.02.05 | ability to perform hydrostatic tests using equipment such as pressure gauges and pumps |
| 3.02.06 | ability to perform vacuum box test |
| 3.02.07 | ability to perform air testing procedures |
| 3.02.08 | ability to interpret results of tests |
| 3.02.09 | ability to recognize leaks |
| 3.02.10 | ability to vent systems as required. |

Sub-task**3.03****Maintains safe work environment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- | | |
|---------|---|
| 3.03.01 | knowledge of WHMIS |
| 3.03.02 | knowledge of workers' rights and responsibilities |
| 3.03.03 | knowledge of company safety policies and procedures |
| 3.03.04 | knowledge of site-specific training requirements |
| 3.03.05 | knowledge of types and operation of fire extinguisher equipment |
| 3.03.06 | knowledge of housekeeping practices |
| 3.03.07 | knowledge of federal, provincial and municipal health and safety acts and regulations |

3.03.08	knowledge of site-specific emergency procedures
3.03.09	knowledge of on-site safety locations such as first aid stations, safety showers, eye wash stations and muster points
3.03.10	knowledge of disposal and recycling procedures
3.03.11	knowledge of hazardous materials such as asbestos, silica and ceramic fibers
3.03.12	ability to apply WHMIS procedures
3.03.13	ability to interpret safety and environmental regulations
3.03.14	ability to recognize, prevent and report personal injury hazards
3.03.15	ability to participate in site orientation and safety training
3.03.16	ability to handle and store hazardous materials
3.03.17	ability to install temporary safety protection such as barriers and lockouts
3.03.18	ability to install ventilation equipment according to planned procedures
3.03.19	ability to recognize and correct unsafe practices

Sub-task

3.04

Monitors confined spaces.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.04.01	knowledge of locations requiring the monitoring of confined spaces such as vessels and trenches
3.04.02	knowledge of hazards of confined spaces such as various gases and surrounding conditions
3.04.03	knowledge of properties of gases
3.04.04	knowledge of types of gases such as chlorine, carbon dioxide, hydrogen sulfide and mercaptan
3.04.05	knowledge of site-specific requirements for monitoring confined spaces
3.04.06	knowledge of site-specific training requirements
3.04.07	ability to communicate with emergency personnel
3.04.08	ability to recognize and report emergency situations
3.04.09	ability to direct evacuation of confined spaces
3.04.10	ability to document personnel entering and exiting confined spaces
3.04.11	ability to monitor and document atmospheric conditions of confined spaces
3.04.12	ability to maintain constant contact with personnel in confined spaces

Sub-task**3.05****Demobilizes worksite.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- | | |
|---------|---|
| 3.05.01 | ability to recognize hazards of operating plant such as moving parts, electrical shocks, noise and hazardous products |
| 3.05.02 | ability to remove tools, equipment and excess materials |
| 3.05.03 | ability to clean work area |
| 3.05.04 | ability to inventory and load tools, equipment and excess materials |

Task 4**Performs cutting and welding activities.****Context**

Boilermakers use various processes to cut material. They perform tack welding and other basic welding to temporarily join components. Final welding may be performed by boilermakers as allowed by jurisdictional regulations.

Sub-task**4.01****Cuts material.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- | | |
|---------|---|
| 4.01.01 | knowledge of oxy-fuel and electric cutting equipment such as plasma cutters and oxy-acetylene torches |
| 4.01.02 | knowledge of cutting equipment components such as radiographs, flashback arrestors, tips, strikers, hoses and regulators |
| 4.01.03 | knowledge of cutting fuels such as mapp gas, oxygen, acetylene and propane |
| 4.01.04 | knowledge of mechanical cutting equipment such as grinders, band saws, shears, reciprocating saws and water jet cutting tools |
| 4.01.05 | knowledge of types of material to be cut such as steel, fiberglass and aluminum |

4.01.06	knowledge of ferrous and non-ferrous materials and their properties
4.01.07	knowledge of lens shades for cutting processes
4.01.08	ability to select cutting tools and equipment
4.01.09	ability to set up work environment protection such as hoarding, fire blankets and flash screens
4.01.10	ability to identify ventilation requirements
4.01.11	ability to select and use ventilation equipment
4.01.12	ability to set up and use plasma cutting equipment
4.01.13	ability to set up and use oxy-fuel equipment
4.01.14	ability to set up and use mechanical cutting equipment
4.01.15	ability to adapt cutting procedures according to tools available
4.01.16	ability to recognize hazards such as fire hazards, electrical shocks, gas fumes and flying debris
4.01.17	ability to finish material using methods such as grinding and shaping
4.01.18	ability to clean up after the cut

Sub-task

4.02

Prepares joints.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.02.01	knowledge of types of joints to be used such as butt, double bevel, lap, lay-up (fiberglass) and bolted
4.02.02	knowledge of automatic beveling machines
4.02.03	knowledge of material grades and sizes
4.02.04	knowledge of welding process to be used
4.02.05	knowledge of codes and standards related to components
4.02.06	ability to purge and dam components
4.02.07	ability to select and use tools and equipment such as grinders, milling gun and files
4.02.08	ability to finish material using methods such as grinding, shaping and beveling
4.02.09	ability to bevel the component using methods such as flame cut, milling and grinding
4.02.10	ability to clean joint prior to fit up

Sub-task**4.03**

Fits joints.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.03.01	knowledge of fitting methods and procedures
4.03.02	knowledge of welding process to be used
4.03.03	ability to select and use tools and equipment such as locking pliers, C clamps, levels, hammers, dogs and wedges, hydraulic jacks and hickey bars
4.03.04	ability to determine alignment tolerances
4.03.05	ability to pre-heat and post-heat components
4.03.06	ability to interpret site-specific fitting specifications

Sub-task**4.04**

Performs tack welds.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.04.01	knowledge of parent material to be tacked
4.04.02	knowledge of welding procedures
4.04.03	knowledge of jurisdictional certification requirements
4.04.04	knowledge of types and sizes of welding electrodes
4.04.05	knowledge of PPE required
4.04.06	ability to pre- and post-heat materials if required
4.04.07	ability to interpret welding codes and symbols
4.04.08	ability to use tools and equipment such as electrodes, ground clamps and chipping hammers
4.04.09	ability to place tack welds according to required strength and accessibility
4.04.10	ability to identify hazards such as arc flash, electrical shock, fumes and burns

Sub-task**4.05**

Performs basic welding.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
no	yes	NV	yes	yes	yes	yes	yes	yes	no	ND	ND	ND

Supporting Knowledge & Abilities

4.05.01	knowledge of basic welding processes such as shielded metal arc welding (SMAW), gas metal arc welding (GMAW) and gas tungsten arc welding (GTAW)
4.05.02	knowledge of parent material to be welded
4.05.03	knowledge of welding procedures
4.05.04	knowledge of purging and damming
4.05.05	knowledge of weld defects such as undercut, porosity and overlap
4.05.06	knowledge of jurisdictional certification requirements
4.05.07	knowledge of required PPE for welding process
4.05.08	knowledge of the duties of a "spark watch" person during cutting/welding activities
4.05.09	ability to interpret welding symbols and documentation
4.05.10	ability to select and use types and sizes of welding electrodes
4.05.11	ability to perform basic weld joints such as lap, butt, plug and fillet
4.05.12	ability to perform welds on non-pressure and non-structural components
4.05.13	ability to set up and use related welding equipment such as machines, cables, purge assemblies and ground clamps

Sub-task**4.06**

Performs advanced welding. (NOT COMMON CORE)

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
no	yes	NV	yes	yes	yes	yes	no	no	no	ND	ND	ND

Supporting Knowledge & Abilities

4.06.01	knowledge of advanced welding processes such as submerged arc welding (SAW), orbital welding, exotic metal welding and GTAW
4.06.02	knowledge of jurisdictional certification requirements
4.06.03	knowledge of advanced metallurgy

- 4.06.04 knowledge of structural and pressure welding
- 4.06.05 ability to interpret welding symbols and documentation
- 4.06.06 ability to apply advanced welding processes and procedures
- 4.06.07 ability to assess type of equipment to be used
- 4.06.08 ability to visually inspect completed weld

Trends

Safety is increasingly emphasized in rigging and hoisting. Lifts require more comprehensive pre-lift planning with all individuals involved.

Due to safety standards, warranty and insurance demands, there is an increased use of engineered lifting documentation.

Specialized training is becoming more common for boilermakers involved in rigging and hoisting.

**Related
Components**

All components apply.

**Tools and
Equipment**

Rigging and hoisting equipment, hand tools, power tools, measuring and layout tools, welding and cutting equipment, work access equipment, PPE and safety equipment.

Task 5**Plans lift.****Context**

Lifts are planned to ensure that the proper rigging practices and safety factors are taken into account by boilermakers.

Sub-task**5.01**

Determines load.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- | | |
|---------|---|
| 5.01.01 | knowledge of rigging formulas and working load limit (WLL) |
| 5.01.02 | ability to read prints |
| 5.01.03 | ability to identify material to be lifted |
| 5.01.04 | ability to measure dimensions of load |
| 5.01.05 | ability to calculate weights of loads using required formulas |
| 5.01.06 | ability to determine centre of gravity of loads |

Sub-task**5.02****Performs pre-lift analysis.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- | | |
|---------|---|
| 5.02.01 | knowledge of properties of load to be lifted such as dimensions, shape and weight |
| 5.02.02 | knowledge of area surrounding lift |
| 5.02.03 | knowledge of signaling methods such as two-way radios, hand signals and air horns |
| 5.02.04 | knowledge of delegation of responsibilities of personnel such as lead hand, operator, signaler and tag line person |
| 5.02.05 | knowledge of dry run procedures |
| 5.02.06 | ability to recognize lift hazards such as overhead wires, load drift, wind speed, unstable ground conditions and obstructions |
| 5.02.07 | ability to interpret engineered lift drawings |
| 5.02.08 | ability to interpret load charts and perform load calculations |
| 5.02.09 | ability to anticipate equipment required for rigging removal such as manlifts, scissor lifts, man baskets and scaffolding |

Sub-task**5.03****Selects rigging and hoisting equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- | | |
|---------|---|
| 5.03.01 | knowledge of rigging equipment such as slings, shackles, chain falls and come-alongs |
| 5.03.02 | knowledge of hoisting equipment such as cranes, blocks, Tirlfors, tuggers and chain falls |
| 5.03.03 | knowledge of types of cranes such as truck-mounted, conventional and rough terrain |
| 5.03.04 | knowledge of bundle pullers |
| 5.03.05 | knowledge of rigging equipment needed for specific applications |

5.03.06	knowledge of types of ropes used in rigging such as wire, natural and synthetic
5.03.07	knowledge of rigging and hoisting capacity and radius
5.03.08	ability to match rigging equipment to load
5.03.09	ability to ensure rigging meets parameters of WLL

Sub-task

5.04 Secures lift area.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

5.04.01	knowledge of swing zone and swing clearance
5.04.02	ability to advise public and other trades of impending lift
5.04.03	ability to clear area
5.04.04	ability to set up barricades and barriers
5.04.05	ability to conduct pre-lift safety checks

Task 6

Rigs load.

Context

Rigging is an integral part of the boilermaker trade. Rigging equipment is used so that loads or personnel can be hoisted in a safe and secure manner.

Sub-task

6.01 Inspects rigging equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.01.01	knowledge of rigging equipment
6.01.02	ability to interpret rigging tag information such as date, size and capacity

6.01.03	ability to recognize damaged and defective rigging equipment
6.01.04	ability to render damaged equipment inoperable

Sub-task

6.02 Fabricates rigging equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	no	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.02.01	knowledge of rigging equipment that can be fabricated such as lifting lugs, spreader bars and lashing
6.02.02	knowledge of jurisdictional regulations regarding fabrication of rigging equipment
6.02.03	knowledge of requirements and specifications of rigging
6.02.04	knowledge of fabrication methods such as splicing, cutting and welding
6.02.05	knowledge of limitations to fabricating rigging equipment
6.02.06	ability to lay out equipment for fabrication
6.02.07	ability to use lug charts
6.02.08	ability to splice synthetic and fibre ropes

Sub-task

6.03 Attaches rigging equipment to load.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.03.01	knowledge of rigging equipment and practices such as using softeners, positioning shackles and setting spreaders
6.03.02	knowledge of hookup points
6.03.03	knowledge of function, advantages and limitations of various sling arrangements such as basket, choke and bridle hitch
6.03.04	knowledge of types and functions of knots, bends and hitches
6.03.05	ability to determine centre of gravity of load
6.03.06	ability to hook rigging to load

6.03.07	ability to access rigging points using equipment such as scissor lifts, manlifts and ladders
6.03.08	ability to use secondary rigging to transfer loads
6.03.09	ability to include adjustment rigging equipment such as chain falls and come-alongs
6.03.10	ability to include control devices such as tag lines, holdbacks, guy wires and Tirlfors
6.03.11	ability to select and tie knots to be used in rigging

Sub-task

6.04 Maintains rigging equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.04.01	knowledge of basic maintenance requirements for rigging equipment
6.04.02	ability to clean and lubricate rigging equipment
6.04.03	ability to recognize damaged and defective rigging equipment

Sub-task

6.05 Uses aerial access equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.05.01	knowledge of aerial access equipment such as man baskets, swing stages, spider stages and bosun's chairs
6.05.02	knowledge of anchor points
6.05.03	knowledge of location considerations such as clearances and access
6.05.04	knowledge of rescue plan in the event of swing stage failure
6.05.05	knowledge of jurisdictional certification requirements for equipment
6.05.06	ability to select and inspect aerial access equipment
6.05.07	ability to assemble aerial access equipment

- 6.05.08 ability to install safety features such as lifelines, toe boards, guard rails and rope grabs
- 6.05.09 ability to install and test motor for swing stages

Task 7

Hoists load.

Context

Hoisting a load is lifting the equipment or components into place. It is done following the rigging setup. In many cases, it is a team effort involving operators, signallers and lead hands. It is important that boilermakers participate in hoisting operations for safety and to ensure that equipment, components and personnel are protected during the operation.

Sub-task

7.01

Inspects hoisting equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 7.01.01 knowledge of hoisting equipment such as cranes, tuggers and chain falls
- 7.01.02 knowledge of load charts
- 7.01.03 knowledge of identification requirements for hoisting equipment
- 7.01.04 knowledge of capacity of hoisting equipment
- 7.01.05 knowledge of hoisting equipment operation
- 7.01.06 knowledge of anchor points and outriggers
- 7.01.07 ability to perform walk-around inspection
- 7.01.08 ability to recognize damaged and defective hoisting equipment

Sub-task

7.02

Assembles hoisting equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

7.02.01	knowledge of hoisting equipment components such as blocks, boom sections and counterweights
7.02.02	knowledge of reeving sequences
7.02.03	knowledge of crane and tugger assembly procedures
7.02.04	knowledge of blocks and tackles
7.02.05	ability to determine compressed air requirements for operation of tuggers
7.02.06	ability to calculate distance of travel for lift
7.02.07	ability to install wire rope on tugger drum
7.02.08	ability to ensure structural integrity of tugger anchor points
7.02.09	ability to hang snatch blocks and directional devices
7.02.10	ability to connect air compressor to tugger

Sub-task

7.03 Performs hoisting operation.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

7.03.01	knowledge of operation of hoisting equipment such as chain falls, tuggers and come-alongs
7.03.02	knowledge of certification requirements for the operation of certain hoisting equipment such as fork trucks, carry decks and overhead cranes
7.03.03	knowledge of types of hoisting operations such as pulling, pushing and transferring rigging
7.03.04	ability to use hoisting communication methods such as hand signals, air horns and two-way radios
7.03.05	ability to perform tandem lifts
7.03.06	ability to recognize and correct lift irregularities

Sub-task

7.04 Secures load before rigging removal.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

7.04.01	knowledge of methods used to secure load such as using guy wires, using come-alongs, lashing and welding
7.04.02	knowledge of potential dangers during rigging removal
7.04.03	knowledge of cribbing
7.04.04	ability to ensure stability of load
7.04.05	ability to tie knots
7.04.06	ability to determine requirements for securing load
7.04.07	ability to select securing materials
7.04.08	ability to suspend loads for subsequent placement

Task 8

Performs post-lift activities.

Context

These tasks are done after the lift is completed. They may be performed by the same crew responsible for the lift, or an entirely different crew.

Sub-task

8.01

Conducts post-lift inspection.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

8.01.01	knowledge of inspections done after each lift
8.01.02	knowledge of inspections done after job completion
8.01.03	knowledge of "as found" state in lift area
8.01.04	ability to inspect area for hazards and obstructions
8.01.05	ability to advise that area is clear by removing barriers and communicating with others
8.01.06	ability to assess, tag and report damaged equipment

Sub-task**8.02****Disassembles hoisting equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

8.02.01	knowledge of hoisting equipment requiring disassembly
8.02.02	knowledge of types of cranes and tuggers requiring disassembly
8.02.03	knowledge of crane components such as matting, counterweights, gantries, and boom sections
8.02.04	knowledge of break-down procedures and sequences
8.02.05	knowledge of rigging and hoisting equipment required to do disassembly
8.02.06	ability to coordinate work with operators
8.02.07	ability to use tools for disassembly
8.02.08	ability to load, tag and secure equipment for transport

Sub-task**8.03****Stores equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

8.03.01	knowledge of rigging and hoisting equipment
8.03.02	knowledge of storage procedures
8.03.03	knowledge of storage conditions
8.03.04	ability to protect rigging and hoisting equipment from conditions such as weather, temperature and chemicals

BLOCK C

NEW CONSTRUCTION

Trends

There is an increase in the use of modular assemblies and vessels which may require larger cranes to complete the assembly. There is a corresponding increase in the use of automated equipment to facilitate the work as well as to save time.

There are more exotic metals, requiring special machines and training. There is an increased demand for emissions controls and better plant efficiency, resulting in a broader work scope for boilermakers.

Related Components (including, but not limited to)

Blast furnaces, stoves, coke ovens, tanks, stacks, breeching, vessels, ductwork, boilers, precipitators, scrubbers, rectifiers, burners, water heaters, towers, exchangers, crackers, bag houses, fin-fan coolers, water towers, ships, generators, kilns, penstocks, scroll casing, hoppers.

Tools and Equipment

See Appendix A.

Task 9

Performs fabrication.

Context

Fabrication is the creation of the components from stock material following specific instructions from a plan or a concept. Most components are built in a shop and transported to the jobsite; however, fabrication can also occur in the field. Pre-fitting components ensures that they go together correctly.

Sub-task

9.01

Lays out components for fabrication.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 9.01.01 knowledge of components and materials to be used
- 9.01.02 knowledge of layout methods such as parallel-line, triangulation and radial-line development

9.01.03	ability to select and use layout and measuring tools and equipment
9.01.04	ability to make jigs and templates
9.01.05	ability to determine elevations and orientation
9.01.06	ability to perform mathematical calculations
9.01.07	ability to transfer measurements and elevations
9.01.08	ability to verify measurements and tolerances of components
9.01.09	ability to identify and mark various sections of final product for site assembly and installation using methods such as match-marking and tagging

Sub-task

9.02

Forms components for fabrication.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	no	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

9.02.01	knowledge of forming methods
9.02.02	knowledge of required components
9.02.03	knowledge of steel designations
9.02.04	knowledge of oxy-acetylene process
9.02.05	ability to select and use shop equipment such as brakes, shears, rolls and dies
9.02.06	ability to select and use hand and power tools to form components
9.02.07	ability to finish fabricated material to achieve desired form
9.02.08	ability to check components against plans and specifications
9.02.09	ability to use clamps for transporting and forming
9.02.10	ability to make templates to check angles and form components

Sub-task

9.03

Constructs components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

9.03.01	knowledge of types of materials
9.03.02	knowledge of types of fasteners
9.03.03	knowledge of fastening methods such as bolting, welding and expanding
9.03.04	knowledge of component being constructed
9.03.05	knowledge of construction specifications
9.03.06	ability to select and use tools and equipment such as strongbacks, key plates and shim plates
9.03.07	ability to fit components together according to plans and specifications
9.03.08	ability to ensure components keep their shape by installing spider braces, stiffeners and angle braces
9.03.09	ability to match-mark cut or formed pieces

Task 10

Prepares for new construction.

Context

Boilermakers need to organize the site and place material so it is available when and where needed. This allows boilermakers to work safely and effectively.

Sub-task

10.01

Prepares site.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

10.01.01	knowledge of site layout
10.01.02	knowledge of site accessibility
10.01.03	knowledge of site and company policies and procedures such as safety and orientation
10.01.04	ability to recognize hazards such as overhead wires and live units
10.01.05	ability to set up equipment such as shipping containers, tools, tool trailers, and crane according to plans and specifications
10.01.06	ability to set up work areas

10.01.07	ability to inspect and inventory tools and equipment
10.01.08	ability to distribute tools to identified work areas
10.01.09	ability to organize and store tools and equipment

Sub-task

10.02 Assesses job.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

10.02.01	knowledge of work to be accomplished
10.02.02	ability to recognize equipment and tool needs
10.02.03	ability to foresee possible difficulties
10.02.04	ability to adapt to shifting worksite needs
10.02.05	ability to identify worksite hazards
10.02.06	ability to coordinate work with co-workers

Task 11

Assembles and fits vessels and components.

Context

Pre-assembly is assembling vessels or components in sections or modules prior to final installation. Aligning is putting the components and vessels in the desired location. Fitting ensures the proper placement of the vessels and components prior to fastening them in place.

Sub-task

11.01 Aligns vessels and components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

11.01.01	knowledge of alignment methods and procedures
11.01.02	knowledge of orientation and elevation

11.01.03	knowledge of alignment and tolerances
11.01.04	ability to select alignment tools and equipment
11.01.05	ability to follow instructions found in plans and specifications
11.01.06	ability to align vessel or component with existing component
11.01.07	ability to read part numbers and match-marks to mate components

Sub-task

11.02 Fits vessels and components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

11.02.01	knowledge of fitting methods and procedures
11.02.02	knowledge of pre-assembly requirements and procedures
11.02.03	knowledge of tolerances for conditions such as out-of-level, out-of-plumb and high-low
11.02.04	ability to select and use tools and equipment
11.02.05	ability to lay out and pre-assemble components and vessels
11.02.06	ability to use sweep templates and chord charts
11.02.07	ability to ensure fit before fastening vessels and components
11.02.08	ability to prepare location to ensure proper fit using methods such as welding on stopper bars and using dogs and wedges
11.02.09	ability to check components for fit and function
11.02.10	ability to temporarily fasten components to existing components or vessels
11.02.11	ability to modify components in-place to achieve proper fit

Task 12

Fastens components.

Context

Boilermakers use several techniques other than welding (see Block A) to fasten components during construction. This is a critical task in order to complete the final installation.

Sub-task**12.01**

Bolts components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

12.01.01	knowledge of types, grades and sizes of bolts
12.01.02	knowledge of bolting sequence
12.01.03	knowledge of bolt tensioning equipment
12.01.04	ability to select and use tools and equipment such as torque wrenches, impact wrenches and hammer wrenches
12.01.05	ability to select bolt types, grades and sizes for application
12.01.06	ability to prepare components prior to fastening using methods such as lubricating, cleaning and buffing
12.01.07	ability to ensure final fit before tightening bolts on vessels and components
12.01.08	ability to torque and tension bolts according to specifications

Sub-task**12.02**

Expands tubes.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

12.02.01	knowledge of expansion theory and techniques
12.02.02	ability to select and use expansion tools and equipment
12.02.03	ability to use measuring devices
12.02.04	ability to perform tube expansion calculations
12.02.05	ability to recognize hazards

Sub-task**12.03**

Lays up fiberglass.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 12.03.01 knowledge of types and grades of fiberglass materials such as cloth, resins and fillers
- 12.03.02 knowledge of mixing and curing procedures
- 12.03.03 knowledge of accelerators, retarders and promoters
- 12.03.04 ability to recognize hazards of working with fiberglass such as fumes, airborne particles and fire hazards
- 12.03.05 ability to mix fiberglass resins
- 12.03.06 ability to apply lay-up techniques such as rolling, brushing and spraying
- 12.03.07 ability to select and use ventilation equipment
- 12.03.08 ability to store and dispose of fiberglass materials

BLOCK D

UPGRADING, MAINTENANCE AND REPAIR

Trends

There is an increased demand by industries to upgrade their systems to increase productivity and efficiency.

Related Components

All components apply.

Tools and Equipment

See Appendix A.

Task 13

Services vessels and components.

Context

Boilermakers help to ensure the proper operation of vessels and components by verifying their integrity and repairing them as needed. Modifying existing systems entails replacing components and materials to improve performance or reliability, and can be done during scheduled maintenance. Sometimes, vessels and components cannot be repaired and need to be replaced. Boilermakers need to know when rigging, fitting and cranes are needed to accomplish the tasks.

Sub-task

13.01

Upgrades vessels and components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

13.01.01	knowledge of site conditions
13.01.02	knowledge of scope of work
13.01.03	knowledge of existing system
13.01.04	knowledge of permit requirements such as for gas tests, hot and cold work and confined space
13.01.05	knowledge of fasteners

13.01.06	knowledge of required changes as detailed in the blueprints and specifications
13.01.07	ability to verify that permit requirements are met
13.01.08	ability to select and use tools and equipment
13.01.09	ability to isolate, blind, blank, and lock and tag
13.01.10	ability to identify site modification requirements such as demolition, component removal and adjustments
13.01.11	ability to create access or openings to work area
13.01.12	ability to move materials to appropriate location
13.01.13	ability to dispose of materials
13.01.14	ability to fit and fasten components to existing systems
13.01.15	ability to recognize hazards of removing and adding components
13.01.16	ability to replace material with appropriate material
13.01.17	ability to recognize material and components that can be re-used

Sub-task

13.02

Prepares vessels and components for maintenance and repair.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

13.02.01	knowledge of systems and components to be maintained or repaired
13.02.02	knowledge of company and worksite policies and procedures
13.02.03	knowledge of safety procedures and requirements such as ensuring proper ventilation, installing bulkheads and performing lock-out procedures
13.02.04	ability to select and use tools and equipment
13.02.05	ability to set up work area
13.02.06	ability to access or create openings to work area
13.02.07	ability to connect to services and utilities
13.02.08	ability to identify area to be repaired
13.02.09	ability to select the repair material
13.02.10	ability to prepare parent material by cutting and cleaning
13.02.11	ability to prepare repair pieces

Sub-task**13.03** Repairs vessels and components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

13.03.01	knowledge of systems and components to be repaired
13.03.02	knowledge of company and worksite policies and procedures
13.03.03	knowledge of safety procedures and requirements such as ensuring proper ventilation, installing bulkheads and performing lock-out procedures
13.03.04	ability to select and use tools and equipment
13.03.05	ability to set up work area for repair
13.03.06	ability to fasten repair pieces to component or vessel by using fastening methods such as bolting and welding
13.03.07	ability to follow repair procedures

Sub-task**13.04** Replaces vessels and components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

13.04.01	knowledge of existing vessels and components
13.04.02	knowledge of installation methods and procedures
13.04.03	knowledge of vessels and components to be replaced and installed
13.04.04	knowledge of gas testing requirements
13.04.05	knowledge of fastening methods such as bolting, welding and expanding
13.04.06	ability to select and use tools and equipment
13.04.07	ability to coordinate work with other trades
13.04.08	ability to recognize hazards of replacing vessels and equipment such as open holes, products, energized systems, falling materials and height work
13.04.09	ability to secure work area
13.04.10	ability to remove components using methods such as flame cutting, grinding, gouging and unbolting

Sub-task**13.05****Performs preventative maintenance.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

13.05.01	knowledge of inspection methods and procedures
13.05.02	knowledge of company policies and procedures
13.05.03	knowledge of overlay and thermal spray procedures
13.05.04	ability to scrape and clean components
13.05.05	ability to perform hydro tests
13.05.06	ability to perform visual inspections
13.05.07	ability to plug tubes to isolate them from system
13.05.08	ability to recognize worn, damaged and defective vessels and components
13.05.09	ability to inform appropriate authority of possible defects
13.05.10	ability to remove, maintain and replace components

Task 14**Removes vessels and components.****Context**

Vessels and components are removed to be repaired or replaced. Removing equipment, vessels and components allows easier access and facilitates maintenance and repairs. Obsolete vessels and components also need to be dismantled, demolished or removed.

Sub-task**14.01****Dismantles vessels and components.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

14.01.01	knowledge of dismantling methods and procedures
14.01.02	knowledge of safe work practices such as tying off tools and planks
14.01.03	ability to plan the dismantling of components

14.01.04	ability to select and use tools and equipment
14.01.05	ability to coordinate with other trades
14.01.06	ability to secure work area
14.01.07	ability to number and match-mark components to organize dismantled pieces
14.01.08	ability to salvage materials
14.01.09	ability to recognize hazards

Sub-task

14.02 Demolishes vessels and components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

14.02.01	knowledge of demolition methods and procedures
14.02.02	knowledge of safe work practices such as tying off tools and planks
14.02.03	knowledge of vessels and components that can be re-used
14.02.04	ability to identify vessels and components for demolition
14.02.05	ability to plan the demolition of vessels and components
14.02.06	ability to select and use tools and equipment
14.02.07	ability to coordinate with other trades
14.02.08	ability to secure work area
14.02.09	ability to salvage materials
14.02.10	ability to recognize hazards of demolition

Sub-task

14.03 Removes materials.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	NV	yes	yes	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

14.03.01	knowledge of lifting, hoisting, handling and storage methods and procedures
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- 14.03.02 knowledge of proper disposal of waste material
- 14.03.03 ability to select and use tools and equipment
- 14.03.04 ability to plan material and scrap removal
- 14.03.05 ability to coordinate with co-workers
- 14.03.06 ability to secure work area
- 14.03.07 ability to recognize hazards such as pinch point, falling objects and overhead hazards
- 14.03.08 ability to identify material that can be re-used or scrapped

APPENDICES

Personal Protective Equipment and Safety Equipment

atmospheric testing equipment	personal atmospheric monitoring device
coveralls (fire retardant, acid-resistant, plastic oversuit)	protective gloves
CSA protective footwear	respirator (half mask and full face)
cutting goggles	safety glasses and mono goggles
dust masks	self contained breathing apparatus (SCBA) and supplied air breathing apparatus (SABA)
ear plugs and ear muffs	side shields
explosion-proof lights	smoke eaters and ventilation systems
fall arrest equipment (lanyards, harnesses, retractable lanyards, tripods)	tarpaulins
grinding shields	warning tape, tags, signs, barricades
ground fault interrupter	welding glass
hard hat	welding masks
head lamp	welding screens
Kevlar gauntlets and gloves	welding shields
leather protective clothing and gloves	whip checks and pins

Welding Equipment

anti-spatter spray	pre-heating torch and equipment
chipping hammer	purge hoses
electrode holders (whips/stingers)	purge paper
electrode ovens (stationary/portable)	regulators
electrode pouch	remote amperage controls
files	stud welding equipment
fire-retardant blankets	temperature ("temp") sticks
gougers	TIG torch
ground clamps	welding cable
hand wire brush (mild steel and stainless steel)	welding cable "y" connectors
inspection mirror	welding electrodes
leather welding shield	
penlight and batteries	
power sources (welding machines)	
c/w ancillary equipment for welding processes such as ESW, FCAW, GMAW, GTAW and SAW	

Cutting Tools and Equipment

Hand Type

bolt cutters
files
hacksaw and blades
handsaw
metal-cutting chisels
metal-cutting snips
pipe/tube cutters
rigging knife
scissors
tap and die sets
utility knife

Powered Type

abrasive cut-off saw
band saw
circular saw
grinders (air and electric)
nibblers
reciprocating saw
tube milling machine
water jet cutter

Fuel Cutting Equipment

oxygen lance

Oxy-Fuel Cutting Equipment

adapters

burning and heating tips
flashback arrestors
friction lighters (strikers)
manifold systems
manual cutting torches
oxy-fuel cart c/w fire extinguishers
oxy-fuel couplings and wrenches
oxy-fuel cylinders
oxy-fuel hoses and repair kits
radiograph and related equipment
regulators
tip cleaners

Plasma-Arc Cutting Equipment

air line
compressed air source
power supply c/w cables and torch
regulators
replacement ceramic cups and tips

Air Carbon-Arc Cutting Equipment

air-arc gouger
air and power supply
air line
carbon-cutting electrodes
(round/flat)
replacement electrode holder
replacement insulators

Measuring Tools

angle and radius gauges
callipers/dividers
combination square
compass
compound tube gauge
drill point gauge
folding rule
framing squares
laser levels

measuring tapes
micrometers
scale rule
sliding T-bevel
steel tapes
string line
telescoping gauge
vernier calliper

Marking and Layout Tools

ball peen hammer	plumb bob
chalk	prick/center punch
chalk-line	protractor
contour marker	scribe and awl
dividers	soapstone and holder
dye	spirit level
engineer's level	squares
felt pen	steel letter/number set
laser level	straight edge
lumber crayon	trammel points
paint brush	transit (theodolite)
paint marker	water level
piano wire	wrap-around

Hand Tools

Holding Tools

bar clamp
bench vice
C-clamp
end-cut pliers (nippers)
hammer wrench holder
lineman pliers
locking (vise-grip™) wrench pliers
needle-nose pliers
pipe vise
pony clamp
side-cutter pliers
sliding clamp (bessey clamp)
slip-joint pliers
water-pump (utility) pliers/channel
lock pliers

Holding/Turning Tools

adjustable (crescent) wrench
box-end wrench
chain wrench
combination wrench
hammer (slug) wrench
hex keys (Allen wrench)
open-end wrench
pipe wrench
screwdrivers
ratchet and socket wrench sets
strap wrench
spud wrench
torque wrench

Fitting Tools

Hammering Tools

4 lb. mini-sledge hammer
alignment pins
blacksmith's punch
bucking tool
bull pin
C-clamps

clamping angles
claw hammer
come-alongs
dogs and screw dogs
drift pin
flange spreader
hickey bars

Fitting Tools (continued)

hose clamps	shims and wedges
hydraulic jack	sledges
hydraulic ram	soft-face hammer (lead-face)
key plates and blank nuts	spud wrench
metal-cutting chisel	steel, brass and wood wedges
non-sparking hammer	strongbacks
pin punch	wall-banger™
pry bar	

Pneumatic Tools and Equipment

air chippers	filters/oilers
air compressor	hydraulic and pneumatic tensioning equipment
air grinders	hydrostatic test pump
air hammers	impact wrenches/sockets
air manifolds/receiver	milling machine
air scalers	regulator
air supply hose	sand blasting equipment
air utility hoist (air tugger)	rolling motor
drills	

Electric-Powered Tools and Equipment

cut-off saw	hammer drill
circular saw	impact wrench (electric and battery)
drills/presses	induction heat gun
electric screwdriver	jigsaw
electric supply panel	nibblers/shears
exhaust fans	die grinder
extension cords	reciprocating saw
floodlights	string/trouble light
grinders	

Rigging Equipment

beam clamps	headache ball
beam trolleys	hooks/latches
blocks (tackle, wire rope, snatch)	jacks (hydraulic, screw, air bags, steamboat ratchet)
chain falls	links, swivels, rings, thimbles, eye bolts
come-along	load binders
equalizer plates	plate clamps
equalizer sheaves	
fibre rope	

Rigging Equipment (continued)

rigging belt	swivel hoist ring
shackles	terminal end connections for wire
slings (wire rope, kevlar, fibre	rope (clips, sockets)
material, chain, synthetic web,	Tirfor jacks
wire/chain mesh)	tuggers
softeners	wire rope
spreader and equalizer beams	

Tube Removal/Expansion Tools and Equipment

air motor c/w adapter sleeves	internal tube cutters (revolution tube
beading tool	cutter, fly cutter)
collapsing tools	knockout tool
expansion accessories (e.g., driving	splitting chisels
links, universals, gear drive)	torque controlled rolling motor
expanders for boilers and heat	tube drift
exchangers c/w mandrels	tube end mill
flaring/belling tools	tube plugs
hydraulic stub puller	tube pulling spear
induction heat gun	tube wall reducing tool

Tube Preparation/Installation Tools

die grinder c/w variety of stones	serrating tool
files	tube cut-off saw
flapper wheels/emery cloth	tube guide
hand/power brushes (twist)	tube hold reamer
lead hammer	track saw
peening tool (hydraulic expander)	

Tools and Equipment for Fiberglass

aluminum-serrated rollers	masking tape
barrel heater	mohair rollers
brooms	paint brushes
carborundum grinding discs (16-36	plastic buckets (5 l. - 20 l.)
grit)	putty knife
catalyst dispenser	resin spray gun/hoses
fiberglass material cutting tools	roll of cardboard
grinder c/w flexible disc back	rubber gloves
heat lamps	shovels
kilo scale	wooden mixing spatulas

aerial access equipment	access equipment that is rigged by the boilermaker (e.g. swing stages, spider stages, man basket)
atmospheric testing equipment	a calibrated direct-reading instrument for testing various potential hazardous atmospheric conditions in a confined work space
bag house	enclosure through which dust particles are collected as exhaust gases pass through a fabric filter
blast furnace	a smelting furnace into which compressed hot air is driven to complete the first stage in the production of all iron-based metals
boiler	a closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum by the application of heat from combustible fuels, electricity or nuclear energy
bolt tensioner	a power-assisted mechanical or hydraulic device used to tighten fasteners to a pre-determined torque value; may also be used in reverse to loosen fasteners
boom	the main member used to carry the hoisting tackle on a crane
breeching (gas flue)	a transition component from the convection box to the flue
carbon arc cutting	an arc cutting process in which metals are severed by melting them with the heat and air pressure of an arc between a carbon electrode and the base metal
catalyst	an additive that accelerates a chemical reaction that causes resin to harden (e.g. methyl ethyl ketone peroxide (MEKP))
chain falls	a hand/pneumatic/electric-operated chain hoist
coke oven	tightly sealed unit to keep out air so coal cannot burn; rather it "bakes" with an intense heat up to 2100°F to produce coke
come-along	ratchet-type tool with chain and hook used for pulling

confined space	an area other than an underground working that a) is enclosed or partially enclosed, b) is not designed or intended for continuous human occupancy, c) has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service, and d) is large enough and so configured that a worker could enter to perform assigned work
dog	a tool used in fitting up components
ductwork	a passage for air flow
dye penetrant test	a process used to check for surface deficiencies and flaws in parent metals and welds
equalizing bar	bar or beam used to equalize the loads in sling legs or to equalize loads on dual hoist lines during tandem lifts
ferrous	metals dominated by iron in their chemical composition (i.e., carbon and low alloy steels)
fiberglass	glass reinforcement material (i.e., chopped strand mat, woven roving)
heat exchanger	a vessel in which heat is transferred from one medium to another
heat induction	a process of electrical heating and cooling used in tube removal
hydrostatic test	a strength and tightness test of a closed pressure vessel by water pressure
lashing	a rope wrapping two pieces to fasten them together
lattice boom	a type of framework crane boom, usually raised or lowered by wire rope mechanisms
magnetic particle test	a non-destructive method of detecting cracks, porosity, seams, inclusions, lack of fusion and other discontinuities in ferromagnetic materials in surface discontinuities and shallow subsurface only
metallurgy	involves the science of producing metals from ores, of making and compounding alloys, and the reaction of metals to many different activities and situations
non-ferrous	metals that contain little or no iron in their chemical composition (e.g., aluminum, copper)

outriggers	extendable beams attached to a crane base mounting that rest on supports at the outer ends and provide a means of balancing the load and relieving the crane weight from the tires
oxy-fuel cutting	a group of cutting processes used to sever metals by means of the chemical reaction of oxygen with the base metal at elevated temperatures; the necessary temperature is maintained by means of gas flames obtained from the combustion of a specified fuel gas and oxygen
parts of line	the number of individual ropes supporting a travelling block in a tackle system
penstock	conveys water from the reservoir to the generating unit
plasma-arc cutting	an arc cutting process that severs metal by melting a localized area with a constricted arc and removing the molten material with a high velocity jet of hot, ionized gas issuing from the orifice
precipitator	an ash separator and collector of the electrostatic type
promoter	an additive used with rapid cure resins to reduce excessive exothermic heat build up
purge	involves using a gas heavier than air to displace oxygen in an enclosed space
reeve	the act of passing a rope through a number of sheaves in a multi-part system in order to gain mechanical advantage
resin	a polyester (vinylester) solid usually dissolved in styrene, but when mixed with a catalyst, forms a rigid thermoset plastic
scrubber	an apparatus used to remove solids from gases by entrainment in water
shackle	a u- or anchor-shaped fitting with pin
sling	a wire rope or other material with eyes spliced on each end
snatch block	a wheel or pulley whose side can be opened to allow positioning of the rope without having to feed it through the block
splice	the joining of ends of ropes by weaving the strands of one rope over and under the strands of the other rope

spreader bar	beam used for hoisting trusses or long loads; also used to equalize the weight and to keep the load, such as tank plate, from buckling
stack	a vertical conduit used to discharge combustion products to the atmosphere
stove	used to heat air to speed combustion
swing stage	a suspended scaffold
tackle	an assembly of ropes and sheaves arranged for lifting, lowering and pulling
tag line	a length of rope used to control a load during lifting or lowering
thermal spray	process of depositing molten metal, alloy and ceramic coatings on prepared surfaces in order to build up surfaces worn down by heat, oxidation and chemical environments
Tirfor	manual or pneumatic pulling machine
tower crane	a power-operated fixed or slewing tower that provides elevation and support for its jib
tube expanding	the pressure-tight joint formed by enlarging a tube end in a tube seat
tugger	a power source for hoisting or moving, usually consisting of a cable drum with gear-reduction unit for hand operation or with power drive
vacuum box test	a non-destructive test designed to find leaks in welded lap joints of storage tank floor; soapy water is applied to the joint, then the air is removed from the sealed see-through box creating a vacuum and exposing the leaks
vessel	a cylindrical or spherical container with closed ends designed to contain liquids, gases, or solids
water cutting	a process of using a jet of water under high pressure to sever through a variety of construction materials
water level	an instrument used to determine the level of an object by means of the surface water in a tube
work platform	a work platform set on the ground which may have primary controls on the platform (e.g., scaffolding, scissor lift)

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
CSA	Canadian Standards Association
FCAW	flux-cored arc welding
GMAW	gas-metal arc welding
GTAW	gas tungsten arc welding
JSA	Job safety analysis
MSDS	Material Safety Data Sheets
MTR	Mill Test Report
NDT	non-destructive testing
PPE	personal protective equipment
SABA	supplied air breathing apparatus
SAW	submerged arc welding
SCBA	Self-contained breathing apparatus
SMAW	shielded metal-arc welding
WHMIS	Workplace Hazardous Materials Information System
WLL	Working Load Limit

APPENDIX D

BLOCK AND TASK WEIGHTING

BLOCK A OCCUPATIONAL SKILLS

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	17	10	NV	20	30	39	10	25	30	5	ND	ND	ND	21 %

Task 1 Uses and maintains tools and equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	13	15	NV	25	30	28	20	20	20	5	ND	ND	ND	20%

Task 2 Organizes work.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	15	15	NV	25	30	21	20	30	15	20	ND	ND	ND	21%

Task 3 Performs routine trade activities.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	45	30	NV	25	15	21	30	20	35	45	ND	ND	ND	29%

Task 4 Performs cutting and welding activities.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	27	40	NV	25	25	30	30	30	30	30	ND	ND	ND	30%

BLOCK B RIGGING AND HOISTING

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	17	35	NV	30	25	23	30	30	25	35	ND	ND	ND	28%

Task 5 Plans lift.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	25	27	NV	20	35	30	30	30	20	30	ND	ND	ND	27%

Task 6 Rigs load.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	.35	27	NV	30	25	30	30	30	35	45	ND	ND	ND	32%

Task 7 Hoists load.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	25	27	NV	30	25	27	30	30	30	15	ND	ND	ND	27%

Task 8 Performs post-lift activities.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	15	19	NV	20	15	13	10	10	15	10	ND	ND	ND	14%

BLOCK C NEW CONSTRUCTION

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	30	25	NV	25	20	22	30	20	30	20	ND	ND	ND	24%

Task 9 Performs fabrication.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	28	25	NV	20	25	27	25	30	30	20	ND	ND	ND	26%

Task 10 Prepares for new construction.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	23	10	NV	20	25	19	25	10	10	5	ND	ND	ND	16%

Task 11 Assembles and fits vessels and components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	32	30	NV	30	25	27	25	30	30	45	ND	ND	ND	31%

Task 12 Fastens components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	17	35	NV	30	25	27	25	30	30	30	ND	ND	ND	27%

BLOCK D UPGRADING, MAINTENANCE AND REPAIR

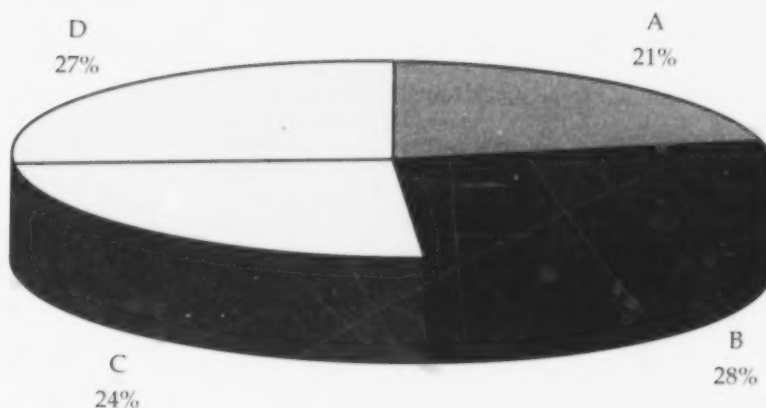
	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average 27%
%	36	30	NV	25	25	16	30	25	15	40	ND	ND	ND	

Task 13 Services vessels and components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	62%
%	72	70	NV	60	60	63	50	60	65	60	ND	ND	ND	

Task 14 Removes vessels and components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	38%
%	28	30	NV	40	40	37	50	40	35	40	ND	ND	ND	



TITLES OF BLOCKS

BLOCK A	Occupational skills	BLOCK C	New construction
BLOCK B	Rigging and hoisting	BLOCK D	Upgrading, maintenance and repair

*Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

APPENDIX F

TASK PROFILE CHART — Boilermaker

BLOCKS		TASKS	SUB-TASKS				
A	OCCUPATIONAL SKILLS	1. Uses and maintains tools and equipment.	1.01 Maintains hand tools.	1.02 Maintains power tools.	1.03 Maintains measuring and layout tools.	1.04 Maintains shop equipment.	1.05 Maintains cutting and welding tools and equipment.
			1.06 Uses aerial work platforms and access equipment.	1.07 Uses personal protective equipment (PPE) and safety equipment.			
		2. Organizes work.	2.01 Uses documentation.	2.02 Uses drawings and specifications.	2.03 Organizes project tasks and procedures.	2.04 Handles materials and components.	2.05 Communicates with others.
		3. Performs routine trade activities.	3.01 Inspects vessels and components for defects.	3.02 Tests vessels and components.	3.03 Maintains safe work environment.	3.04 Monitors confined spaces.	3.05 Demobilizes worksite.
B	RIGGING AND HOISTING	4. Performs cutting and welding activities.	4.01 Cuts material.	4.02 Prepares joints.	4.03 Fits joints.	4.04 Performs tack welds.	4.05 Performs basic welding.
			4.06 Performs advanced welding. (NOT COMMON CORE)				
		5. Plans lift.	5.01 Determines load.	5.02 Performs pre-lift analysis.	5.03 Selects rigging and hoisting equipment.	5.04 Secures lift area.	
		6. Rigs load.	6.01 Inspects rigging equipment.	6.02 Fabricates rigging equipment.	6.03 Attaches rigging equipment to load.	6.04 Maintains rigging equipment.	6.05 Uses aerial access equipment.
		7. Hoists load.	7.01 Inspects hoisting equipment.	7.02 Assembles hoisting equipment.	7.03 Performs hoisting operation.	7.04 Secures load before rigging removal.	

BLOCKS		TASKS	SUB-TASKS				
C	NEW CONSTRUCTION	8. Performs post-lift activities.	8.01 Conducts post-lift inspection.	8.02 Disassembles hoisting equipment.	8.03 Stores equipment.		
		9. Performs fabrication.	9.01 Lays out components for fabrication.	9.02 Forms components for fabrication.	9.03 Constructs components.		
		10. Prepares for new construction.	10.01 Prepares site.	10.02 Assesses job.			
		11. Assembles and fits vessels and components.	11.01 Aligns vessels and components.	11.02 Fits vessels and components.			
		12. Fastens components.	12.01 Bolts components.	12.02 Expands tubes.	12.03 Lays up fiberglass.		
D	UPGRADING, MAINTENANCE AND REPAIR	13. Services vessels and components.	13.01 Upgrades vessels and components.	13.02 Prepares vessels and components for maintenance and repair.	13.03 Repairs vessels and components.	13.04 Replaces vessels and components.	13.05 Performs preventative maintenance.
		14. Removes vessels and components.	14.01 Dismantles vessels and components.	14.02 Demolishes vessels and components.	14.03 Removes materials.		

